

## ABSTRACT OF THE DISCLOSURE

The present invention demonstrates that BMP-2/4 activates osteopontin gene transcription by removing Hoxc-8 binding through Smad1 interaction with the Hoxc-8 DNA binding domain. Since the DNA binding domain is conserved in all Hox and homeodomain-containing proteins, Smad1 likely interacts with all Hox or homeodomain-containing proteins. Furthermore, the present invention reveals the Smad1-mediated transcriptional mechanism in the BMP-2/4 signaling pathway and also provides information about the transcriptional roles of the Hox genes during embryonic development.